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o Thesis

The Ideal, of collecting the worlds knowledge drove the evolution of the World Wide Web or The web cheated on me

This thesis aims to answer the question how we got from the ideal of linking the world's knowledge to the hypertext structure we experience now on the World Wide Web.

The desire to gather the world's knowledge in one place is not an idea of the internet era. The idea of a world encyclopedia existed since the beginning of the 20th century. I am interested in the question how the World Wide Web adapted this idea and how it was realized technically. This thesis is presenting this evolution based on 5 different people, who took a crucial part in realizing the World Wide Web.

Hypertext

When I talk about the Web, I am talking about hypertext because this is the technological concept behind the World Wide Web. It is the organization of hypertext that makes me believe that all knowledge is connected and I just have to click another link that would guide me to the information I want to know.

It is a system that I can enter by means of the internet. To be able to retrieve data from the internet I need a web browser that downloads the data I am asking for from a Web server and shows me on my screen in the form of a website.

In a hypertext you can link to other hypertexts, images, videos, etc by hyper links. By following a link the underlying resource invokes. The user moves from document to document. This is the process we call surfing the web (haven't heard this term a while) that I will investigate in my thesis.

1 Motivation

When I was 16 I gave a talk about Franz Kafka in front of my class in High school. Of course at this time I was more interested in hanging out with my friends than reading "Das Urteil", one of the most famous novels of Kafka. Fortunately Wikipedia was flourishing in Germany in this time. And because my teachers were pretty slow in getting along with the internet,

we, as students, had an easy life for the next two years. It was the time when I copied all information from Wikipedia and probably stopped thinking myself. I still haven't read the novel yet, but a lot about it.

Some time ago somebody asked me if I read "Das Urteil" what I answered with a yes. Although I have never read the novel, I got the feeling to know it. The internet made me believing of being able to understand everything. In front of my eyes there was opening up a new world of knowledge and I just had to take it. The idea that I can find every information was established because the internet seemed to be the place where the world's knowledge comes together - always only a few links away from me. The link seemed to be the wheel of the information age. Technically, the link is a simple guide, but textual the link symbolizes the idea that the web brings together all information. (Lobo, 2011) For the time in High school that was enough. I was satisfied with what I got from the web. The era of punditry began.

When I am looking back I realize that my high school time was the time when I started looking up every information on the web. The web became this all-knowing machine to me. It seemed smarter than my father and so far I only met a few people who were smarter than my dad. I thought that state borders and individual borders will disappear. I thought the internet will democratize the world, makes it a better place because access to knowledge was possible for everyone and it seemed to be the key for every problem. By chance I was born into the right time - it has never been easier to inform yourself.

After ten years believing that the Web will help me in understanding everything I want to know, I realize that I use the Web in a very limited way. I don't get my questions answered which leads to disappointment. I feel betrayed. The Web cheated on me because it didn't kept its promise of making me a very well-educated person. It's true that it has never been easier to inform ourselves - so, why do I have the feeling to live in a society that has never been so badly informed? What went wrong?

To find out where my disappointment with the web comes from. I analyzed my webbrowser history for half a year to find out what kind of information I am looking up. I noticed one major difference between all information I consume: there is a distinction between what I call active and passive knowledge.

The active knowledge is all information I am searching for, consciously, starting from scratch. The last month were for example influenced by writing this thesis. I was searching for articles about the history of the WWW, I checked Wikipedia for simple facts of Engelbart and Bush's life and downloaded papers, books and essays that are related to the evolution of hypertext. Besides this educational information, I am looking up a lot of practical information, that makes my life easier, for example, I am checking the weather and the programme of the cinema and the opening hours of the Albert Heijn. There is a difference between this educational knowledge and the very practical knowledge but they do have in common that both is active informatio because I take an active choice in looking it up. This is the part of my own web behaviour that has not really changed since I am 16. This is when the web becomes this great information tool.

The other sort of information is the passive information. The information, I follow through clicking. Its the information I loose control about. This

always happens when I get lost in the structure of hypertext and just click the next suggested link.

My own web behaviour follows most of the time a clear pattern: after a longer break (this can be for example the beginning of the day after a night where I am not online) I start looking for information target-orientated. I usually start a day by checking my emails what is followed by reading the news and then looking up all kind of organizational information, like the schedule at the PZI wiki to know how my schedule for the day looks like. But sooner or later there comes the moment when I click on a link that pulls me into the depths of the hypertext structure. This first link is usually one that leads me to a photo series or a youtube link or to imdb or any other distractive website. Up to this moment my web-use was very consciously, I was the one who chose what information I want to read. The moment, when I click the first link of such an image gallery, I get lost. I start clicking my way through a complete image gallery or several dozen of related films on imdb or a countless number of recipes on a food blog. Not because I want to deepen in a certain topic or I am really interested in 30 different apple pie recipes or want to know who was the best dressed actress at the Oscars, but because I am guided to another link. As long as there is another link, you will always click it if there is waiting a reward for us. This reward could be another image, another related song, or even a "moo" as the example of "Cowclicker" illustrates: Cow Clicker was a Facebook game created in 2011 by the gamedesigner Ian Bogost as a satire of undemanding "social games" such as FarmVille. In Cow Clicker, you clicked on your cow and it mooed. This was it. You then had to wait another six hours to click again, unless you paid for the right to click again immediately. Bogost's joke became a surprise hit: at its height, Cow Clicker had more than 50,000 users. (Burkeman, 2013)

2.1 Introduction

First of all I want to say that this thesis is not claiming to write the truth about the history of the World Wide Web. During my research I found out that there are an incredible number of different versions and mythical stories about the Web evolution. In the beginning I was willing to find out the truth but after a while I capitulated. If even Al Gore is calling himself the father of the internet - I have to admit that there is no THE inventor of the World Wide Web, but several dozen. This thesis examines five of them. Five fathers that identify five major trends in the development of the WWW and the ideal of bringing together the world's knowledge. I partly adapted this idea Manuel Castells book "The Internet Galaxy" but decided to start a bit earlier than he did - I will start with Paul Otlet and his invention of the Mundaneum. I will continue with Vannevar Bush, Douglas Engelbart, Ted Nelson and Tim Berners-Lee.

The development of hypertext has started with the idea of an universal library, that was first driven by Science Fiction authors. Kurt Laßwitz, the German Science Fiction author published an essay in 1901 entitled "Universal Library" in which he proclaimed a universal library. A universal Library is a library that is in possession of all publications that were published in the past, the present and the future. This idea was taken up by other Science Fiction authors such as H.G. Wells. Wells released a collection of essays between 1936-38 in which he envisioned the "World Brain". He describes it as a new, free, synthetic, authoritative, permanent world encyclopedia that could help world citizens to make

the best use of universal information resources and make the best contribution to world peace.

Also Jorge Luis Borges took up the question of how a library, that consists of all existing books, looks like and also how publications could be ordered to find them back. In 1939 he published a short story "The total library" (which provides the basis for his much better known "library of Babel" that was published two years later), in which he published this idea. But this was all utopia.

When Borges and H.G. Wells were busy writing down their utopias, there was one man who was already translating all the Science Fiction thoughts into realization. The talk is of Paul Otlet. Paul Otlet's invention of the Mundaneum because is one of the most beautiful because most complex and idealistic concepts of creating an analogue hypertext system.

2.2 Paul Otlet - *By the reorganization of information, classification and documentation Otlet wanted to establish an international organization of knowledge - a world center of knowledge*

Paul Otlet was born in 1868 in Brussels as a son of a wealthy industrial family. His childhood he spent with private teachers in libraries. During his law studies he got frustrated by the disorganization of technical literature - he recognized the weaknesses of the library system of 19th century what prompted him to create the "Office International de Bibliography" in 1895 together with Henri La Fontaine. The office' aim was to create a universal library - The Mundaneum (Hartmann, 2006)

His Motivation was very clear: he detested violence and believed in peaceful, verbal altercation what made him becoming one of the masterminds of the League of Nations and the Unesco. He hoped that his archive of the world's knowledge will help to secure peace because it will promote the faculty of reason.

Otlet was convinced that the global spread of knowledge and the exchange of it would promote world peace. (Laaf, 2011)

His dream was to create an universal network that allows the distribution of knowledge without any restrictions. For a peaceful understanding the world's knowledge need to be accessible for everyone. Therefore his vision was to create location-independent access to knowledge, thus making knowledge widely available no matter where it was located.

At the beginning there is the plan that Paul Otlet and Henri La Fontaine had taken 1895 in Brussels - to create a repertory of all knowledge, the "Répertoire Bibliographique Universel". It represents nothing less than an attempt to document all publications available worldwide, so to create a kind of meta-level to the flood of publications.

The idea was discussed at an international bibliographic conference and institutionalized to a central unit, the "Institut International de Bibliographie". It is aimed to create the technical basis for the new organization of information, classification and documentation. The goal of the "Institut International de Bibliographie" was to create a world center of knowledge. The Palais Mondial later called Mundaneum, that opened its doors in 1920 on the occasion of the world's fair. (Laaff, 2011) The Mundaneum looked like a mixture of a book museum and a meeting

point for intellectuals.

By means of the archiving system that was developed especially for the Mundaneum, all publications were indexed and connect with each other. This storage system consisted of 16 million handwritten indexing cards that were ordered by themes. Thus he invented a system to navigate through all publications. It was a very advanced analog hypertext system.

Maybe the Mundaneum can be considered as the first search engine. The Mundaneum worked as a paper Google. By mail or telegram users could make a request. The librarians who were working at the Mundaneum would then search for the right answer and send it back to the requestor, handwritten, via mail for 5 Centimes per indexing card. This could take weeks. (Belgische Botschaft, 2012)

The more the political situation darkened in the years before WW II the more fantastic and visionary Paul Otlet's vision of education became. He developed multimedia concepts to develop the cooperation opportunities for researchers. He planned multi media machines that would connect the phone with the book, television and radio. More and more he tried to replace books by other media because information could be conveyed easier and faster via sound and film. For example, he developed multimedia furniture that would work without paper. Via a telephone network the user could call related books and films. Also he outlined the idea to transfer scientific conferences via phone or video transmission. (Laaff, 2011) He wanted to achieve what now a days each computer can provide - the location-independent exchange of information. Also he prepared a lot of charts that were burned on microfilm. It was a method to universalize information- as diagrams are readable internationally. The more his vision grew, the less understanding he got. In 1934 he was thrown out of his knowledge palace. The Mundaneum and a lot of his plans were destroyed during WW II

Today all of this sounds familiar: a kind of world network of knowledge, through which you can easily conjure every movie, recording and every book on your computer screen. Amazing, that he published this plan already in 1934. There was no Internet, no MP3s, no computers. But this lack of technology could not prevent Paul Otlet of his vision of a knowledge network, which he spread in the book "Traité de documentation" on more than 400 pages.

In some ways, his "mechanical brain" was not only ahead of his own time, but even ahead of today. For example, Paul Otlet didn't want to just link pieces of information as the World Wide Web does now. He suggested intelligent links that would in addition also include information about veracity and context. (Laaff, 2011) This is what we now call Semantic Web - its practical implementation still is not completely fulfilled yet.

In the documentary „Alle kennis van de wereld (Biography of Paul Otlet)“ from 1998 the narrator Boyd Rayward, who is Otlet's biographer says in the end: "I could imagine Otlet on the one hand being rejoicing about the creation of the internet and the web and being terribly upset by the lack of organization of it on it and suggesting: we better have a classification system of this sort to avoid cyberspace debris" (Alle Kennis van de wereld, 1998)

His whole life Paul Otlet worked on a organizational and technical realization of documenting the worlds knowledge and became the first who translated the utopian idea of collecting the worlds knowledge into reality. He created an analog hypertext system that could navigate through all publications.

Ten years after the Mundeaneum closed, Paul Otlet died. A few months after his death, Vannevar Bush published his famous essay on the knowledge store of the future - and thus became immortal.

2.3 Vannevar Bush – In 1945 Vannevar Bush was the first person who designed the concept of a digital hypertext system. In his legendary article ‘As we may think’ he writes about the Memex, a machine that would allow readers to create personal indexes to documents and to link passages from different documents together.

The engineer was born in 1890 in Massachusetts. He worked at the MIT before he advised President Roosevelt as "Science Advisor". In 1941 he became the Director of the Office of Scientific Research and Development. It was his job to organize the knowledge of Roosevelt's scientist as effectively as possible for military use. He had the overview of all technology projects that were funded by the White House. During the Second World War, the Office of Scientific Research coordinated all military research programs, including the Manhattan Project to develop the atomic bomb. Bush promoted the political decision to build the atomic bomb in the spring of 1941, whose technical development has been accelerated as a result of the Japanese attack on Pearl Harbor in December of the same year.

Bush also worked on "proximity fuse" a special proximity fuze for shells, that could by radio technology control the detonation more precisely. Bush was also responsible for enhancing the development of radar and sonar, and he was involved in the founding of the American defense contractor Raytheon.

Since the beginning of the WW II he enjoyed a certain celebrity status. Colliers Weekly presented him in early 1942 as "the man who will win or lose the war" and in 1944 his face was printed on the cover of Time magazine, which represented the engineer as "general of physics."

In July 1945, Bush published the essay "As we may think" in the Atlantic Monthly, in which he imagined a device "in which an individual stores all his books, records and entire communication that may be consulted with extraordinary speed and flexibility. It is an enlarged, personal supplement of his memory", called Memex (memory extender). (Bush, 1945)

Probably Bush's motivation to write the essay was his own frustration about the previous forms of scientific management. At the beginning of his essays, he writes: "There is a growing mountain of research but the methods for coping with this flood of information are out of date." (Bush, 1945) At the same time, however, there were new techniques in order to process information quickly and reliably, such as photocells, microfilm, steel cathode tubes and relay connections.

Bush tried to find an answer to the question how research could be used to help the post war era - somehow he felt obliged to. he said that the same scientist who helped to win WW II have to use the "cheap electronics" (Turner, 2008 p. 106) to develop a new form of information development. The knowledge the scientist used to produce nuclear weapons that theoretically could have wiped out humanity, must be used to unite "the great record of human activity" (Turner, 2008 p. 106). What to me sounds like a kind of justification or compensation, seemed to be a logical conclusion for Bush. He always adapted science to the time needs. Technological conducted no longer to win the war, therefor to create the best possible war technology. But in the post war years, technology conducted to promote humanity on an intellectual level.

The sticking point for Bush lies in the storage of data. "A record, if it is to be useful to science, must be extended Continuously, it must be stored, and above all it must be Consulted." (Bush, 1945)

In the U.S. nobody knew about Otlet's referencing system. There, data so far was ordered alphabetical and numeric and to find something you had to follow exactly this schematic. Bush was convinced that this contradicts the human brain because the mind works associatively. "With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts". (Bush, 1945) The future in technology would be in the ability to mechanize association. To illustrate exactly this idea, Bush designed a machine called Memex - it was a thought experiment.

The Memex looked like a desk on which two screens are mounted, each on one side. Inside the desk are electromechanical controls and microfilm equipment. The operator of this machine can enter text and drawings through a photocopier which will be projected on the screens. This data is then stored in a microfiche filing system. With levers the operator can scroll back and forth between information, and save and recall documents. Also, there is the possibility to refer between different sites through links. Texts and extracts from texts can be stored and later linked to other information.

The memex encompassed data compression, internal information exchange and information exchange with other users. "Most importantly Bush introduced the notion of 'associative indexing', enabling the user to make trails through the mass of information and record those trails, which can be followed and annotated by other users. It is this capacity in particular that would later come to characterize the areas known as hypermedia and multimedia" (Gere, 2004 p.70)

His mission was to increase the effectiveness of human research. With his utopian idea of creating a knowledge management system, as the Memex was, he wanted to change the way people archive and document knowledge.

Even if there wasn't a technology yet that could realize his utopian network of knowledge, he gave a brilliant and influential preview of some of the features Ted Nelson would attempt to realize Xanadu.

The Memex was a local, analog computer that was capable to combine all knowledge of one user. Even if he was planning to exchange data, the Memex didn't implement the idea of linking knowledge in different places, this was the next step. Ted Nelson took.

2.4 Ted Nelson – In *Computer Lib Manifesto (1965)* he envisioned a hypertext of interlinked information. He worked on XANADU, an open, self-evolving hypertext system aimed to link all the planets information in the past, present and future

Ted Nelson was born in 1937 and grew up in Greenwich Village. After he left college with a BA in philosophy he went to Harvard. There he got passionate about finding a system that would help him, not only to write his essays but also to insert the sources at the same time. For a course in Harvard he invented a writing system that allowed users to store their work, change it and print it out. Nelson's system included features for comparing alternate versions of texts, backtracking through sequential versions, and revising the outline. But because he failed to finish the coding, he failed the course.

Even if it was his intention to get his PhD in social relations, his attempt to finish this project became much more important to him. In 1965 he submitted a paper to the Association of Computing Machinery (ACM) in which he explained his vision of hypertext. However, his speech had little impact. Although his ideas were intriguing, Nelson still lacked the technical knowledge to prove that it was possible to build the system he envisioned. Therefore the non-specialist researcher was not taken seriously in the computer science scene. (Wolf, 1995)

But he was not discouraged and kept working on his hypertext system. In 1967 he named it Xanadu, after a poem by the poet Cold Ridge. Xanadu was a software framework that would "enable access to all the world's textual information and make it possible to link and examine texts in parallel and to produce new versions" (Gere, 2004 p.133).

Xanadu was the first global hypertext publishing system. It was meant to be an universal library, a worldwide hypertext publishing tool, a system to resolve copyright disputes (the idea was that every author who published hypertext via Xanadu, has to admit certain quotation rights, but the author can ensure the references to his authorship. For further exploitation the author gets paid automatically via a micro-payment system) and a meritocratic forum for discussion and debate. Nelson was convinced that by putting all information within reach of all people, scientific ignorance would be eliminated and political ignorance would be cured. Xanadu was just the right tool to spread the world's knowledge what would save the world. (Wolf, 1995)

Maybe it is due to the fact that Ted Nelson was a scattered man with a short attention span that he wanted to develop a computer program that could keep track of all his divergent paths of thinking and writing. He was convinced that only technology could prevent the destruction of life on earth. Because technology wouldn't forget like the human mind. Technology could preserve and link the world's knowledge in the past, present and future. (Wolf, 1995)

In "From Counter Culture to Cyber Culture" Fred Turner writes that "for this generation, to which I count Nelson, computing was a form of political rebellion. Computers may have been large and centralized, they may have always been guarded by institutionalized experts and they may have been used to organize the war in Vietnam, but this generation would put them to new uses" (Turner, 2008)

Xanadu was neither developed in the computer labs nor has Xanadu been commissioned by the military. Ted Nelson's urge toward global improvement was highly influenced by the counterculture and the Whole Earth Catalogue (WEC). The WEC was founded in 1986 by Stewart Brand.

It was a printed catalog that listed tools and ideas that were important for an alternative lifestyle. According to Stuard Brand a symbiosis of technology and alternative lifestyle. Among others, the Catalog listed ideas of alternative thinking, sources for agricultural implements, building/craft tools, musical instruments, aids to physical and mental self-help, care of animals and philosophy. The Whole Earth philosophy was always to support the idea of community and to enable a free exchange of ideas through networks.

The atmosphere in the 60s in the United States was characterized on the one hand by optimism and prosperity but on the other by fear of nuclear terror, atomic weaponry, the invasion of American troops in Vietnam in 65, racial discrimination and the increasing pollution. The growing unease resulted in different movements like the Anti Vietnam movement, women's liberation, civil rights movement, nuclear deterrence. Alongside all these activities, the early development of personal computers was happening. And Ted Nelson has been just as impressed by new technology as well as the alternative thinking of the counter-culture.

Nelson was socialized in this technology/alternative culture that created the circumstances in which the personal computer and the current digital culture were born.

It was the Whole Earth Catalog that inspired Ted Nelson to write *Computer Lib / Dream Machines*, his most famous publication - a 300.000 word manifesto of the digital revolution.

Computer Lib contains of everything enraged or inspired him during the month he wrote it, including: population statistics, hacker psychology, the evils of IBM, holograms, musical notation, Watergate and how to program in Trac. *Dream Machines*, the literal flip side of *Computer Lib*, was about the transformation of the arts through computers. It included a description of Xanadu.

Xanadu has never been realized. It will probably go down in history as the longest-running vaporware project in the history of computing. (Lischka, 2009)

Unlike Bush, Nelson thought much more global. The Memex was a sort of analog computer that would enable the user to link different texts. When Nelson developed Xanadu, the personal computer was invented already - he was not interested in designing a machine like the Memex was, Nelson however was working on a program that should be working from any computer in the world. But how should that be possible without the world wide web and without the internet? His realization of Xanadu had to wait for the development of the internet and for Tim Berners-Lee who realized much of what Ted Nelson promised. Thus Nelson's influence has been felt more at the conceptual than the practical level" (Gere 2004 , p133)

2.5 Douglas Engelbart – In 1968 he developed the NLS, a System that offered different users in different places to work on one document on the same time

Engelbart was born in 1925 in Oregon. In 1942 he began his studies in electrical engineering at Oregon State University, which he had to

interrupt in 1944 because he was drafted into military service where he was trained to a radar technician. Towards the end of the war he was stationed at the Philippines. There he first got in touch with the idea of hypertext when he read Vannevar Bush's 'As We May Think'. Bush's idea of hypertext should become one of the most inspiration sources in his life. From on this moment he turned his whole life to the technical realization of the Memex.

For Engelbart, technology so far had experienced three phases:

- 1) The American military had developed technology with which it might destroy the world
- 2) In the post war years, technology was used to eradicate disease and increase food production
- 3) Engelbart's present - he realized that technology's efforts of phase 2 often backfired. Rapid food production caused the depletion of soil and the eradication of insects causes ecological imbalances. (Turner, 2008 p. 107)

Engelbart's conclusion was that mankind must solve extremely complex problems. Therefore it was necessary to improve the management of information and the control of human organizations. He felt confident about revealing the solution in the man-machine integration, on which he worked throughout his life.

After the war Engelbart made a second degree at UC Berkeley in Engineering. The young scientist joined the Stanford Research Institute (SRI) in 1957 where he managed the Augmentation Research Center (ARC). "ARC was dedicated to research how computers might be used to augment human intelligence. In its twelve years of existence ARC developed many of the techniques we now take for granted in computing. These included word processing, cutting & pasting, separate windows, hypertext, multimedia, outline processing, computer conferencing and even the mouse". (Gere, 2004 p. 70) For the latter he became immortal but for this thesis his development of hypertext is far more interesting. He promoted the WWW, since Vannevar Bush's idea was not put into practice yet.

Between 1966 and 68 ARC developed a collaborative office computing environment, called On-line System or NLS. NLS offered different users in different places to work on one document on the same time. The users were able to connect texts and text fragments via hyperlinks. Also they could create indexes of keywords that could be searched. It actually worked as a now a day intranet.

NLS was somehow the technical realization of the Memex - it allowed the user to call up and manage information. And beyond that, it would allow the user to work simultaneously with other users on the same text. ARC elevated the process of collective feedback to a principle of social organization. In Engelbart's view, "each individual's comprehension would be increased by the participation of others through a process of collective feedback facilitated by the computer". (Turner, 2008 p. 108)

ARC was partly founded by ARPA and became one of the first four nodes of the Arpanet.

With the ideas of Bush, Engelbart and Nelson the idea of distributing knowledge through a network was born long ago on a theoretical level.

The technical realization of a network in the sense of the word started to be realized with the Arpanet in 1968 - Exactly 100 years after Otlet's birth.

ARPA (Advanced Research Projects Agency) is now DARPA (Defense Advanced Research Projects Agency - the "defense" was added in 1996). The agency was founded in 1958 by president Dwight D. Eisenhower as a result to the Sputnik crises in 1957. ARPA initiated research projects to push the development of space technology and military technology. But when the NASA undertook this task, ARPA concentrated on the exploration of computer technology.

The ARPA- or DARPA-Net was developed in 1967 of a small group of researchers led by the Massachusetts Institute of Technology (MIT) and the Department of Defense. It is considered as the first network in the sense of the word. In 1969 It connected the SRI where Engelbart worked, with the University of Utah, University of California, Los Angeles and the University Santa Barbara. The compounds were made via telephone lines. This revolutionary decentralized concept already contains the basic aspects of today's internet.

It was Robert Taylor who was a researcher at ARPA at this time and supervises the ARPANet project who had the idea of connecting computers that they could transmit data not only between all ARPA computers but also from computers outside the pentagon, where his office was. Together with Larry Roberts, he developed the concept that the transmission of data should take place in data packages. The transmission of data in chunks goes back to the idea of the engineer Paul Baran. In 1962 he wrote a paper concerning strategies for maintaining communication in event of a nuclear war. In the 60s, in the middle of the cold war, the fear of a nuclear threat felt very real in the United States. Due to this fear, Paul Baran had the idea to create a network that waive a center, so that should any part be destroyed , messages could continue to flow along other routes. His idea was to send data in small ,chunks' and to bring them together at their destination. (Gere, 2004 p. 71)

If the ARPANET made use of this chunk version because technology was driven by military needs as Charlie Gere describes in his book "Digital Culture". Or if they worked in the spirit of Vannevar Busch as Robert Taylor says in the film "The Net": "that they build the Arpanet to enable people in different places who had common interests to share those interests." (The Net, 2003) or if it was build to find a method to take advantage of the bare computing resources of the universities through better data exchange? It is one of the big myth around the internet.

If Ted Nelson designed the Web on a theoretical level, it was Engelbart who created the technical circumstances to realize it technically on two different levels:

The first was the development of NLS and therefore to make it possible to exchange information through a network.

And the second level was, his participation in the development of the Internet. He helped, creating the technical basis to link information not only within a closed network, but to create a global network that could exchange data worldwide.

At a time when the most people thought about computers as calculating

machines, the NLS offered a vision of computers as text processors and tools for collaborating and communication devices.

Engelbart helped developing a network that can send data from one to another computer within a closed network. What still was missing, was a network that could link all data of all computers. Actually a combination of his NLS and the internet. This crucial step was first made by Tim Berners-Lee

2.6 Tim Berners-Lee – He developed the World Wide Web: A HyperTex system that can link and access information of various kinds anywhere, any time

Tim Berners-Lee was born in 1955 in London as the son of two mathematicians. He studied physics and worked as a software developer after he graduated. In the 80s he worked at the Centre Européenne pour la Recherche Nucléaire (CERN) where he developed the World Wide Web.

In March 1989, Berners-Lee published a paper describing the World Wide Web. He designed a digital information network, which he developed in the following years together with his colleagues. The paper begins with the sentence : "The WWW project aims to allow links to be made to any information anywhere" (Berners-Lee, 1990)

His intention to build the WWW was to enable physicists to exchange data, news and documents without the loss of time. But from on the beginning his aim was to extend the WWW to other areas and to connect more servers to the network, servers that would bring in other information. This world wide intention was the reason Berners-Lee called his program World Wide Web (first WorldWideWeb) (Mertens, 2011)

In December 1990, the first web server went online, which he developed in cooperation with Robert Caliau. And in August 6th 1991, he invited his colleagues to a discussion forum where they were supposed to click on a hyperlink that led to the first public web server.

As long as a computer was both, connected to the internet and runs the right software, Berners-Lee's WWW allowed the user to access documents from all computers that work under identical conditions. The program made this connections by hyperlinks and URL (Universal Resource Locator).

For many, the Internet had long served as a system for the exchange of text messages. With the arrival of the Web, it became a way to publish information, to incorporate multimedia formats, and to quickly and easily connect previously discrete clusters of information.

However, when CERN released their browser software, it wasn't such a success in the beginning because it was too difficult to use the software that was necessary to access the WWW.

For business and for society at large, the internet was born in 1995 when Netscape developed the first user friendly browser, that was able to show not only text but interactive elements and graphics without loading them separately. It's technical and open architecture allowed the

connection of all computer networks anywhere in the world!

3 And where are we now?

Otlet, Bush, Nelson and Engelbart have created the conditions that enabled Tim Berners-Lee to realize the World Wide Web and therefore to make it theoretically possible to link the world's knowledge.

Am I, by using the WWW, only one click away from finding the right information? Did the World Wide Web create an architecture that allows linking the world's knowledge?

3.1 Wikipedia - *never before there has been so much knowledge in one place. The eternal human dream to gather the world's knowledge in one place comes a little closer.*

This exactly is Wikipedia's intention - and probably no other web structure has come so close to this target.

Who and what is Wikipedia?

Jimmy Wales, the founder of Wikipedia, made a fortune from speculations at the Stock Exchange in Chicago. With this money he founded Bomis in 1996. Bomis was a search engine for cars, celebrities, sports and the special category "babes". (Stöcker, 2010) The money he made with advertising revenues at Bomis, provided the financial basis for Wikipedia. Wikipedia was first called Nupedia and was a free specialized encyclopedia. Wales dedicated experts to write articles that were checked in detail. After one year the encyclopedia consisted of 20 articles. Wales made the decisive step and opened the lexicon for the general public. Now, everyone was allowed to write and edit articles. Authority was replaced by democracy. In the beginning of 2002 thousands of volunteers had already written more than 20.000 entries. (Reißmann, 2011) From on this moment the number of new articles exploded. In 2007 there were added 1500 new articles every day. In the mean time the rapid growth slowed down but the amount of articles still increases incessantly.

To write about Wikipedia, to me feels almost impossible. Much has been said about it in the last few years - rarely about the holistic brilliance, mostly about its mistakes and gaps. And there are a lot of gaps - to write about them is easy but important.

During the recent years we have witnessed that the "wisdom of crowds" sometimes fails, that companies such as Daimler and BP rewrite their articles, or, in the case of Chevron-Texaco and Microsoft, entire passages, that have been critical, disappeared. Also I think Wikipedia's hierarchical structure is questionable* and the rule of neutrality, that implies that all articles must adopt a neutral position, very flexible. Still, paid advertisers and people on a hateful mission, are editing articles. Therefore volunteers constantly going through the current changes, delete nonsense and distortions from the knowledge pool. Control by the vandalism police. Sometimes that works, sometimes not. The discussion about facts and opinions can take months and produces sometimes an epic amount of text - arguing about neutral language, facts need to be proven by referencing to sources. Whole texts can be deleted or the editing page is blocked because it comes to mind

bashing. There is so much not working in Wikipedia. (Reißmann, 2011)

But still I maintain that Wikipedia saved my life. What would we do without it? I wouldn't have been able to survive my High school time, neither to graduate from my bachelor or to write this thesis. Wikipedia is a wonder of the world - never before so many people have been created something like that together. Never before there was so much knowledge in one place. People order their knowledge together, global and free. (Reißmann, 2011) Wikipedia translated the Ideal of collecting the world's knowledge into the 21st century - still it is far away from perfect, but closer to the ideal than any other system before.

4 Conclusion

Otlet, Bush, Nelson and Engelbart had the ideal to link knowledge to improve a better exchange of data amongst scientists. Thus they enabled a hypertext structure that we know now. They have paved the way for this part of the WWW that I love so much. This part of the Web that allows me to inform myself.

However, these four gentlemen didn't consider the open structure that the web holds now. With this open structure is accompanied, that not only educational knowledge is exchanged, but also cat pictures, Facebook posts and other information debris. How would their systems look like if they would have implied this open structure? Would Xanadu have installed a filter, that only allows to exchange "dignified" information? Would there be space in Otlet's Mundaneum for magazines about the european royal families and motorcycles next to all scientific publications? I can not blame them to not think about the mass of banal information because it was beyond their imagination. The Internet and the World Wide Web was still not sufficiently developed when they formulated their systems.

But there is exactly my problem with the web: The WWW for me doesn't function exclusively as an information tool anymore. It has lost its knowledge aura - at least partially. The web is full of banal content that distracts me. Berners-Lee, however, has thought about the banality. Although he initially wanted to create a platform that should enable other physicists to share their research. When he decided to open up the WWW to people outside of physics he brought the banality into the Web. Not consciously, but rather randomly, eventually also physicist need distraction. The first image that circulated on the World Wide Web showed the french pop group "Les horribles Cernettes". Les horribles Cernettes was the house band of Cern and probably the only girl band in the world who was singing about quantum mechanics, particle accelerators and the relationship troubles of ordinary physics nerds. But did he really knew that this act was the impetus for a worldwide impossibility of concentration? This is how it feels to me sometimes, that it became impossible to concentrate. And this is my personal disappointment with the web.

To me it feels impossible to:

- understand the financial crisis
- find out how serious I should take the political situation in north korea
- learn programming
- take a serious look into Wikileaks
- inform myself better about the situation in Libya
- understand what is actually meant by the word post-humanism

- form an opinion about Barak Obama
- find out if i am a better person if I buy fair trade products

Not because the Web can not help me in forming an opinion about these topics, but because it seems impossible to reach the point where I can dive into a complex topic. I don't get my questions answered because I don't reach the point where I would raise them. To the easy temptation of distraction. Let's face it: it's just way easier to deal with the European aristocracy, than the situation in North Korea. It is much more easy to watch an episode of "Game of Thrones" than to inform myself about the financial crises. This has always been the case and was promoted by every mass media. In TV we call this distraction mode zapping, on the web we have to define a word for this phenomenon. But I do have the feeling that distraction became more essential in the internet era. I go online to look up one apple pie recipe - and end up reading 30 different because there is always another link to another apple pie recipe, one more, and one more and one more.

I could be so formed, if there wasn't the web with its only one klick away temptation. Can I blame the WWW for it or is it in the end me who is cheating to myself because I get trapped by all links? Yes and No. A little more self-discipline would absolutely help me in informing myself about the worlds polotical situation instead of klicking through 44 pictures of Leonarde di Caprio on an imdb photo gallery. Recently there emerged a whole new market, that is concidered with this proplem of Web distraction*

But all these programmms will only help me if I can control myself. And this control is what I am loosing after klicking the "wrong" link. Why do I loose my control so fast?

This is the part for which I blame the web:

The dark secrtet of the internet is that this distraction is very profitable. Every website is trying to keep its reader on the website by undermining people's control of their own attention. They create a situation where people click compulsively - that works much better than trying to convince somebody intellectually to click a link. (Burkeman, 2013)

The links are "written" accoring to algorithms and other forces that may more likely be commercial, or at least driven by forces other than pure knowledge. And because the Websites are so competitive, the market of underlying our consciousness became so elaborated und subtly that I become powerless against distarcting links.

The link that gave me so much possibilities restrict myself on the same time because it pulls me into this infinite world of internet debris. Always only one klick away from another apple pie recipe, of another series of photos, of another music video, of another portfolio. The link became my personal enemy - the enemy in the battle for banality. The banality multiplies to infinity on the web.

I know that I could be so much better informed, the Web created a structure in which I am able to inform myself so well, and I actually want to, wouldn't it be so hard to resist all apple pie recipe and sentimental oscar speeches. I actually want to inform myself!

The practical part of my graduation deals with the moment when my reading and klicking behaviour on the web shifts from making a choice into this state where you klick impulsively. It will be an audio installation where the audience will listen to extracts of my own webbrowser history.

The rythm and direction of the soundfile changes if I started clicking
subconsciusly.

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